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OCR A Level Computer Science H446 – Paper 1

5

Output devices

Unit 1

Components of a computer and their uses

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Objectives

- Describe how different output devices can be applied as a solution of different problems

Output devices

- Output devices take data produced by a computer and turn it into a human-readable form (such as a printed document or an image on a screen)
  - Output from a computer is sometimes used to operate another device (e.g. a loudspeaker or an actuator)
  - The most common output devices are: printers, screens, loudspeakers and multimedia projectors

Inkjet printers

- Inkjet printers are the most common form of printer
  - They range from small inexpensive models to those used for professional photo printing using up to 10 different colours

Operating costs

- Inkjet printers are often sold at or below production cost, while the price of ink cartridges is dramatically marked up
  - Many inkjet printers will not print a black and white page if a colour cartridge runs out
  - Cheaper water-soluble ink tends to smear or blur with the smallest drop of moisture

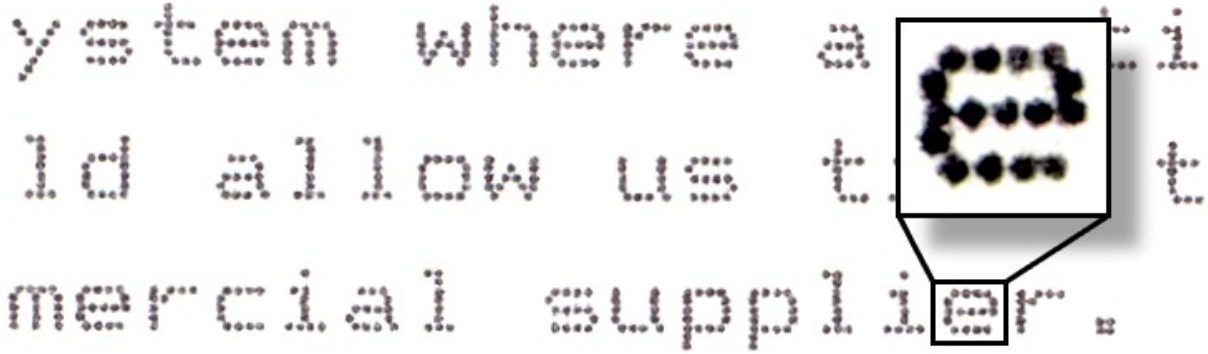
Laser printers

- Laser printers use dry powdered ink called toner
  - They are available in colour or monochrome
- Businesses use almost exclusively laser printers because they are fast and reliable
- Print quality is excellent
  - Common uses include printing company stationery, making labels, creating brochures and fliers

Dot matrix printers

Dot matrix printers are sometimes known as **impact printers.** Similar to a typewriter, they strike an inked ribbon which imprints dots to form letters on the page

- Useful where multi-part stationery is required
- Can work effectively in damp or dirty atmospheres
- Noisy, poor print quality and expensive to buy



Worksheet 5

- Now complete **Task 1** on **Worksheet 5**

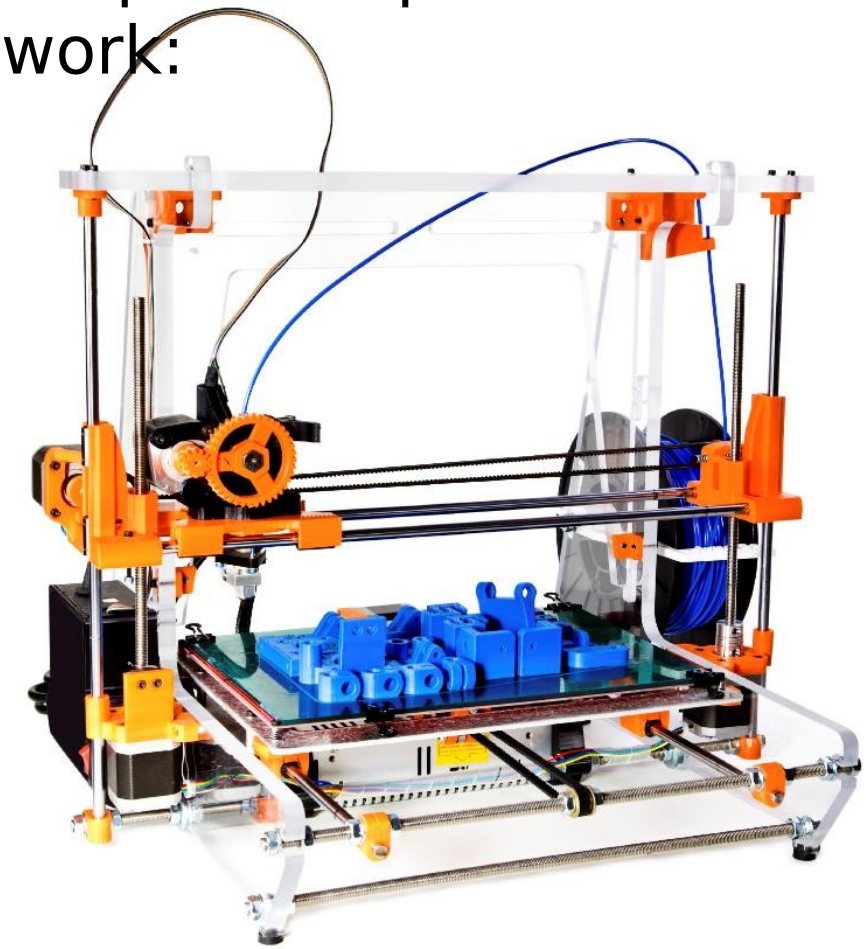
3D printers

3D printers can print using plastic filament, powdered resin, ceramic or metal powder, or paper

- Intricate objects can be printed, including hollow areas

The use of 3D printers

- 3D printers produce solid objects that actually work:



Applications in medicine

- Manufacturing of prosthetic limbs or orthotics
  - Huge reduction in cost and greater accuracy in matching limb to individual patient

- Reconstructive surgery or general surgery
  - Surgeon can “try out” a procedure first to ensure actual surgery is more accurate; can produce very accurate parts for surgical procedures
  - Could a new human organ ever be printed?

Applications in manufacturing and art

- Manufacturing parts for cars
  - Very old cars are likely to need parts no longer manufactured; by using an existing part as a blueprint it is possible to print new components at a fraction of the cost
  - Prototyping for design, fashion and art can save huge costs

The future of 3D printers

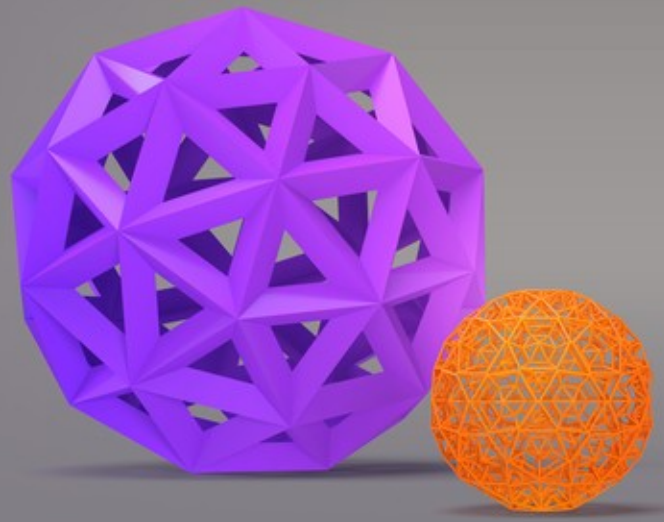
- How might this technology change the world of:
  - Manufacturing?
  - Home printing needs?
  - Medicine and health?
  - Marketing?
  - Architecture?
  - Education?
  - Archaeology?

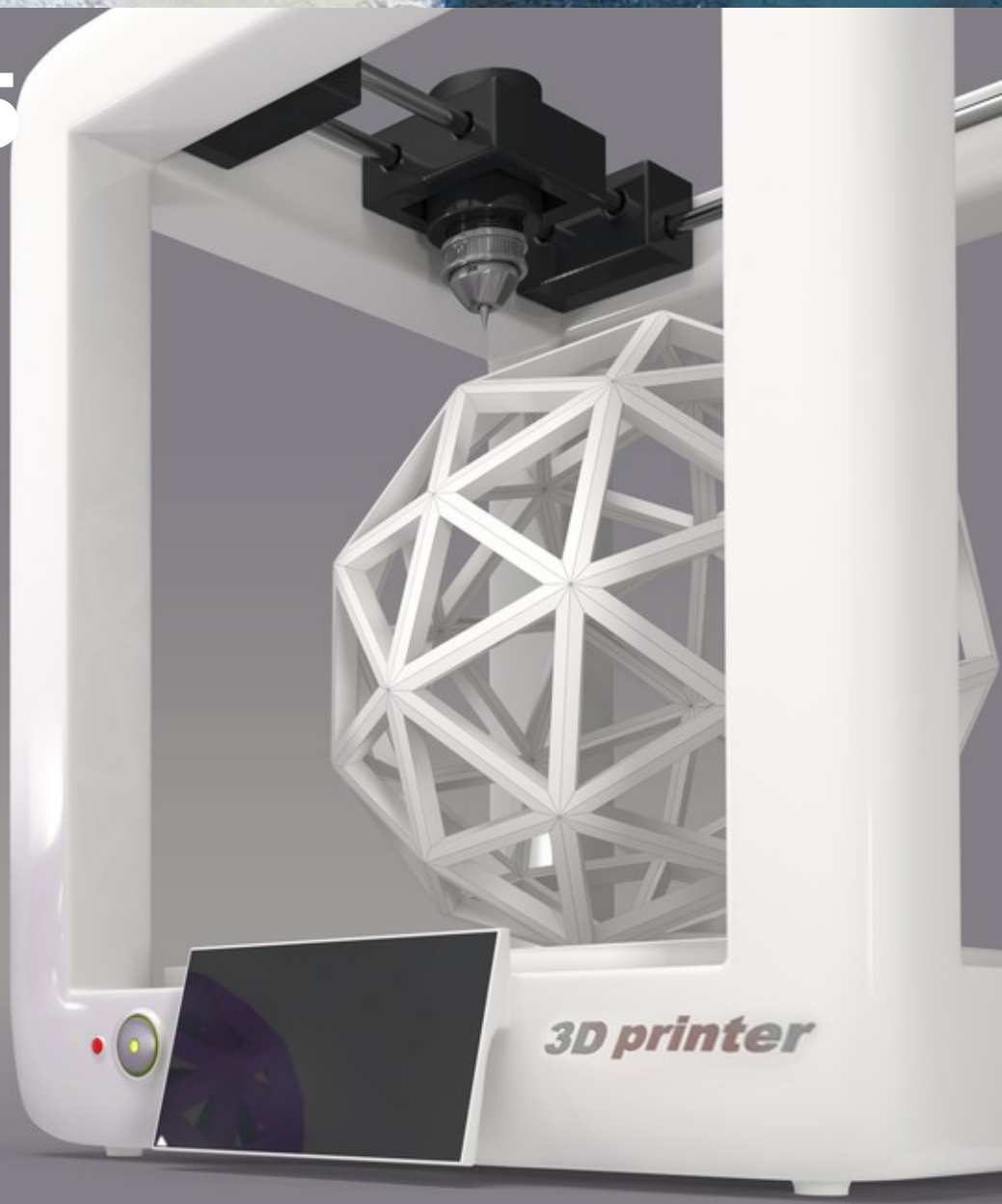
The dangers of 3D printing

- In 2013, the 3D print file required for all the parts of a working gun was created and distributed online
  - Who would be able to print a gun using these files?
  - What implications could this have?
  - How would a plastic gun affect barrier security?

Worksheet 5

- Do **Task 2** in Worksheet **5**





Radio Frequency ID (RFID)

- RFID systems are Input/Output devices
- They use a transponder and a receiver
  - The powered receiver emits radio frequency energy
  - The transponder antenna in the bank card, mobile phone or tag becomes energised by radio waves
  - The transponder can then send data to the receiver

Uses of RFID tags

- Security control points or identification of people, animals, goods or valuables
- Shipping and supply chain tracking for goods
- Banking and fast-
- As a potential rep
  systems

Passive and active tags

- Passive transponders, used in bank cards for example, have no power source themselves and rely on the radio waves from the receiver for their energy
  - Transponders need to be placed very close to the receiver
- Active tags use a larger, battery powered beacon which can broadcast its own signal to receivers up to 300m away
  - These are useful for larger items that are not placed on a receiver by hand, for example in shipping, toll stations, warehousing and control points

RFID chips

- Complete **Task 2** of **Worksheet 5**

Actuators

- Actuators are motors that are commonly used in conjunction with sensors to control a mechanism
- Examples include:
  - Opening a valve or door
  - Starting a pump
  - Turning a wheel or fan
  - Moving an aircraft aileron

Loudspeakers and headphones

- Digital data is sent from the computer to a Digital to Analogue Converter (DAC) where it is converted into an analogue signal
  - The signal is then boosted using an amplifier and finally sent to a speaker

LCD Monitors

- Liquid Crystal Display (LCD) screens contain groups of red, green and blue diodes to form each pixel
  - Monitor screens require backlighting using Cold Cathode Fluorescent Lamps (CCFL) or LEDs since the crystals act as a light valve and do not emit light themselves

LEDs versus CCFLs

- Using LEDs to back-light LCD screens has a number of advantages over the older CCFL technology:
  - They reach their maximum brightness almost immediately
  - The image is sharper with more realistic and vivid colours
  - They produce a brighter light which leads to better picture definition
  - Since LEDs are very small, this allows the screens to be much thinner in construction
  - They last almost indefinitely which makes the screens much more reliable
  - They consume very little power and therefore produce

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Organic LED screens

OLED screens are much thinner and lighter than traditional LCD or LED screens

- Plastic, rather than glass also makes them flexible
- The light emitted from an OLED system is much brighter than the LCD or LED screens

Benefits of OLED technology

- Further benefits include:
  - OLEDs generate their own light so there is no need for the complexity of back lighting
  - Much less power is consumed; good for battery operated devices (e.g. mobile phones, tablets and smart watches);
  - Little heat is produced, reducing fire risk
  - They have a larger field of view than LCD screens – and this is further enhanced when the screen is curved

Worksheet 5

- Now complete **Task 3** on **Worksheet 5**

Multimedia light projectors

- These are compact, high-resolution, full-colour projectors
- They can project text, images, video and audio content
  - Typically the projector will be able to input data from a computer, DVD/CD player or storage device

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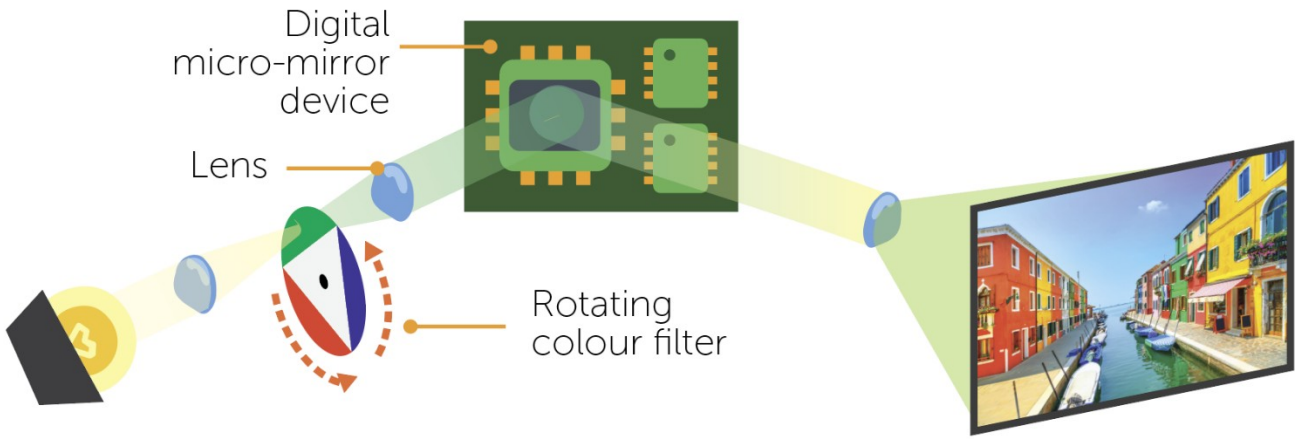
Multimedia projector

- The projector takes a video signal, converts it into a viewable image and projects it on a screen
- It can be used to present PowerPoint slide shows, TV, DVDs, video games and more



Plenary

- Suggest suitable applications for each device:

Device	Application
Laser printer	
Actuator	
Passive RFID tag	
Active RFID tag	
OLED screen	
Multimedia projector	

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